

Mth126 Homework on Confidence Intervals (From Sowder et al., p.773)

1. The candidate for senator hired a firm to take a poll of people in his state to see if he had enough support to win the race against his only contender. The pollsters said they were 95% confident that he had the support of 54% of the voters in the state, plus or minus 5%. Is there a chance he could lose the race? If he wanted to reduce the size of the confidence interval, what might he ask the pollsters to do? Would this solve his problem of uncertainty?
 2. In 1936 Alf Landon and Franklin D. Roosevelt were running for the office of president of the United States. The *Literary Digest* had predicted the winner in several previous elections, and in 1936 the *Digest* predicted that Landon would win by a margin of 57% to 43% and would take 370 of 531 electoral votes. But we all know that Landon did *not* win. He received only 38% of the vote, and only 8 electoral votes! What happened? The magazine had mailed out 10 million sample ballots, of which 2.3 million were returned. Names and addresses were obtained from magazine subscriptions, car registrations, and telephone directories. Why was the *Digest* so mistaken? (*Hint*: How many people owned cars or telephones in 1936?)
 3. Suppose you tossed a thumbtack 100 times and it landed point up 62 times (so the empirical probability of landing point up is 0.62, or 62%). Also suppose the percent of times a thumbtack lands point up is normally distributed, with a standard deviation of 0.05. If you draw a normal curve for the percent of thumbtacks falling point up, what would be your 95% confidence interval for the parameter? Make a confidence statement about p , the percent of times a thumbtack will land point up when tossed.
 4. A newspaper reported that it had polled several voters and found 53% of the voters, with a margin of error of $\pm 2\%$, supported changing Social Security. As a reader of this newspaper and a person hoping someday to receive Social Security checks, what does this report mean to you?
 5. What confidence interval would the $\frac{1}{\sqrt{n}}$ rule of thump suggest if the observed proportion is 52% and the sample size is...
a. 9? b. 90? c. 900? d. 9000?
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Additional problems on confidence intervals:

6. A 10-box sample of cereal boxes is chosen to test the accuracy of the packaging machine. The mean weight of the sample is 24.3 oz. The standard deviation for the 10-item samples may be estimated by statistical methods to be 0.2 oz. What is the 95% confidence interval for the boxes produced by the packaging machine? If the boxes are labeled "24 oz," does the machine need to be adjusted?
7. Suppose your average 'reaction time' as measured by the ruler drop experiment is 7.8 inches with your left hand and 6.4 inches with your right hand, based on a total of 10 trials. Using statistical methods it is possible to estimate the standard deviation of the *average difference* (left hand minus right hand) between the 10 trials; suppose it is 0.6 inches. What is the 95% confidence interval for this scenario? What does the confidence interval suggest about the difference in 'reaction times' between your left and right hands?